(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 335 685 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.06.2018 Bulletin 2018/25

(51) Int Cl.:
A61G 7/10 *(2006.01)*

(21) Application number: **16204008.3**

(22) Date of filing: **14.12.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

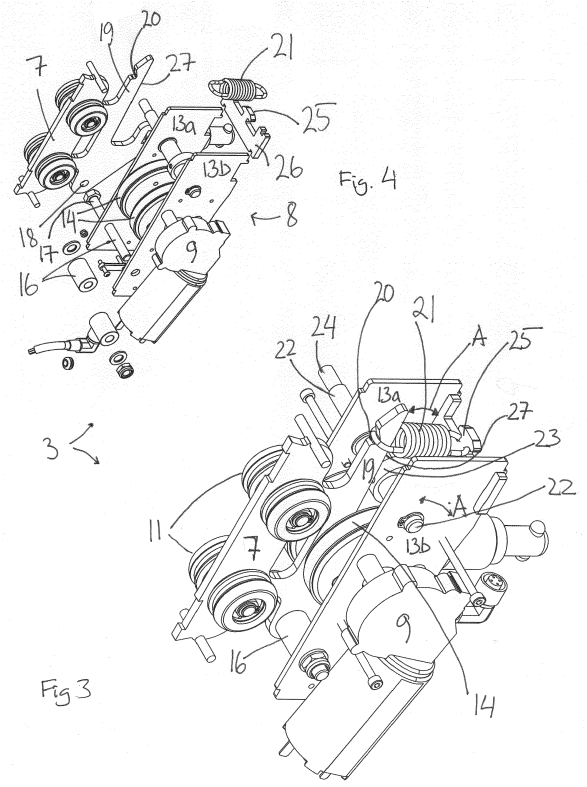
(71) Applicant: **Winncare Nordic ApS**
4220 Korsor (DK)

(72) Inventor: **Christiansen, Richard**
4200 Slagelse (DK)

(74) Representative: **Olesen, Birthe Bjerregaard**
Patrade A/S
Ceresbyen 75
8000 Aarhus C (DK)

(54) **HOIST WITH SAFETY LOCK AND RELEASING SYSTEM**

(57) A hoist (1) where said hoist comprises a trolley (3) with one or more wheels arranged to run along a first running surface (2a) of a rail (2). Said trolley (3) comprises one or more drive wheels (14) and one or more suspension wheels (11). The one or more suspension wheels (11) are rotatably fixed on a cart (7). One or more drive wheels (14) are rotatably fixed to a bracket (8) and said bracket (8) is pivotably connected via a hinge (16) to the cart (7). Said trolley (3) comprises a spring member (21) having a first end connected to the cart (7) and second end connected to the bracket (8). The spring member (21) is provided for pressing the one or more drive wheels (14) against a running surface (2b) on the rail (2). A shaft (22) with an eccentric cam (23) is rotatably mounted in the bracket (8). The eccentric cam (23) acts upon rotation against an edge surface (27) on the cart (7) for rotation of the bracket (8) in relation to the cart in the hinge (16). Hereby said one or more drive wheels (14) are released from contact with the running surface (2b), whereby the one or more suspension wheels (11) are able to rotate freely along the rail (2), e.g. by moving the hoist manually in the rail (2). This provides a safety locking and releasing system for the hoist in relation to the rail (2).



EP 3 335 685 A1

Description

Field of the Invention

[0001] The present invention relates to a hoist, preferably for use in a ceiling mounted rail, where said hoist comprises a trolley with wheels arranged to run along a rail.

Background of the Invention

[0002] It is well-known to lift physically impaired or handicapped persons by means of a hoist.

[0003] When lifting persons in hoists, the hoists usually comprises a sling in which the person is lifted. The sling is usually suspended in a bracket, which is mounted on the hoist system.

[0004] The hoist system may be suspended in a rail system or mounted on a stationary or moveable portal.

[0005] The rails and the trolley (or a moveable portal) allow for horizontal movement, while the hoist unit provides for vertical movement, i.e. up-down movements.

[0006] Permanently mounted hoists are often provided in rail systems, which are usually provided under the ceiling. The rails are e.g. fastened to the ceiling or mounted in fittings which are attached to the ceiling or a wall structure.

[0007] The rails usually comprise at least one surface on which one or more wheels of a hoist cart are arranged in order to suspend the hoisting mechanism. Thus, the cart is suspended in the rail and rests on the wheels, which run on the surface of the rail. In addition, the hoist system comprises one or more motion wheels which engage a friction surface on another surface of the rail. The motion wheel or wheels are powered by a motor, such as an electric motor, which may be driven by a battery or by being connected to a power source. The motion wheels are pressed against the surface to ensure that the motion wheels engage the rail and allow the hoist to move along the rails when the motor is activated. The motion wheels may be pressed against the rail by means of a spring.

[0008] This allows the hoist to move when the motor is activated, but it is impossible to move the hoist manually in case the electric power to the motor is cut off, e.g. when the battery runs dead or during an interruption of the electric power supply.

Object of the Invention

[0009] Thus, it is an object of the present invention to provide a hoist with a safety locking and releasing system, which allows for locking of the hoist position in relation to the rail and/or releasing the locking mechanism.

[0010] It is also an object of the present invention to provide a hoist which allows for manually allowing for manually moving a person in a hoist and locking the position of the hoist in relation to the rail.

[0011] It is also an object of the present invention to provide a hoist which allows for moving the person along the rails by means of a motorized hoist as well as manually, e.g. when a battery runs dead or during interruption of electric power supply.

[0012] In addition, it is an object of the present invention to provide a reliable and inexpensive safety and release system for hoists used in handling physically impaired or handicapped persons.

[0013] Further, it is an object of the present invention to provide a safety and release system for hoists used in handling physically impaired or handicapped persons, which also works when there is no supply of electric power to the hoist unit.

Description of the Invention

[0014] These objects are met by the present invention which provides a hoist, preferably for use in a ceiling mounted rail, where said hoist comprises a trolley with one or more wheels arranged to run along a first running surface of a rail. Said trolley comprises one or more drive wheels and one or more carrying wheels. The one or more carrying wheels are rotatably fixed on a cart. One or more drive wheels are rotatably fixed to a bracket and said bracket is pivotably connected via a hinge to the cart. Said trolley comprises a spring member having a first end connected to the cart and second end connected to the bracket provided for pressing the one or more drive wheels against a running surface on the rail. A shaft with an eccentric cam is rotatably mounted in the bracket, where said eccentric cam upon rotation of the shaft acts against a surface on the cart for rotation of the bracket in relation to the cart in the hinge whereby said one or more drive wheels are released from contact with the running surface, whereby the one or more carrying wheels and are able to rotate freely along the rail.

[0015] This provides a safety locking and releasing system for the trolley in relation to the rails, which is very reliable because it is construed entirely of mechanical elements and is therefore unlikely to break or otherwise malfunction.

[0016] The trolley comprises a cart and a bracket. The bracket is hinged to the cart as described further below.

[0017] The cart is preferably a plate shaped member with an upper end portion arranged to be attached to said one or more carrying wheels.

[0018] Below the attachment points of the carrying wheels, the plate member comprises an attachment point for the hinge member. The hinge member may comprise a rod, a bolt or a stay arranged between side plates of the bracket member and attached at each end to each of the side plates of the bracket (as discussed further below). The hinge member then extends through a hole through the plate member of the cart. Said attachment point for the hinge member is preferably arranged near the front end or rear end of the cart (when seen in the travelling direction in the rail).

[0019] The bracket m comprises two parallel plate shaped members between which one or more additional spacers, such as rods, bolts, plate members or stays may be provided if necessary for improving stability. This allows for providing a space between the two sides of the bracket.

[0020] The cart is preferably mounted in the space between the side plates of the bracket. Preferably, the cart is arranged in a plane which is parallel to the planes of the side plates of the bracket.

[0021] Said shaft with the eccentric cam is preferably also arranged perpendicularly to said plate shaped members.

[0022] Thus, in order to cooperate with a surface on the cart, the eccentric cam member and the cart are aligned in the same plane in the space between the side plates of the bracket.

[0023] The spring member is attached at one end to the cart and at the other end the spring is attached to the bracket. The spring member is present to ensure that the drive wheels are pressed against the second running surface on the rail. Said second running surface is usually provided on the lower outside surface of the rail.

[0024] The bracket comprises a spring attachment member, which is preferably arranged perpendicularly to said plate shaped members of the bracket.

[0025] Similarly, the cart comprises attachment means for the spring member. The spring attachment means are preferably arranged in the opposite end of the cart in relation to the attachment of the hinge member.

[0026] When rotating the rotatable shaft with the eccentric cam, the outer radius of the eccentric cam acts on an opposite surface of the cart. Thereby the bracket is rotated about the hinge element and is thus rotated in relation to the cart, which remains essentially in the same position in relation to the rail. Thus, the eccentric cam acts against the force from the spring which presses the drive wheels against the second running surface on the rail, whereby the grip against the rail is released. Thereby, it becomes possible to release the braking action between the cart and the rail. This allows that the hoist trolley can be moved manually along the rail by a person pushing or pulling the hoist along the rail e.g. by pushing or pulling in a sling in which a person is suspended. This will for example allow for moving a person present in the hoist in the event that there is a power shortage or in case a battery/accumulator of runs out of power.

[0027] Thus, the braking and release system according to the present invention provides an entirely mechanical solution, which is independent of any power supply. Further, the braking and release system according to the present invention is inexpensive and very reliable.

[0028] Preferably, an actuator, such as a handle, is attached to the shaft carrying the eccentric cam for operation of the shaft and the eccentric cam, which enables manual actuation of the safety release system. This is an advantage, because the braking and release system according to the present invention provides an entirely mechanical solution, which is independent of any power supply and thus can be operated manually by rotating of the handle in case of insufficient battery charge or during a power shortage.

[0029] Alternatively, the shaft carrying the eccentric cam of the shaft and the eccentric cam is rotated by a motor. The motor may be the same motor which powers the drive wheels or a separate motor, such as an electrically driven motor as discussed below in relation to the drive motor. This allows for releasing the grip from the rails by the drive wheels by means of the hand held control unit, e.g. when a manual adjustment of the position of the hoist is required. When allowing a motor to rotate the shaft and the eccentric cam, it becomes possible to control the brake and release system, i.e. the braking and the release of holding the hoist trolley to the rail, from a hand held control unit.

[0030] The one or more drive wheels are preferably also mounted in the space between the side plates of the bracket in a rotatable manner, whereby they are aligned with the second running surface on the rails. If two drive wheels are used, it is preferred that one is arranged between each of the sides of the cart and the respective opposite side plate of the bracket, because this provides for a stable construction which does not tilt in the rail.

[0031] The motor unit is preferably fixed to the hinged bracket and acts on the drive wheels to provide a driving force to the drive wheels, which allows for motorized transport in the along the rails. The motor is e.g. electrically driven by means of a battery, an accumulator or similar preferably rechargeable means for providing electrical power to the motor. Where suitable, the motor may also be connected to a power source by means of a cord. The same motor or another motor may provide for up/down movement of the sling.

[0032] The driving and/or lifting action may be controlled on buttons on the hoist unit itself or from a hand held control unit, which may be attached to the hoist by a cord or alternatively in wireless mode.

[0033] The hoist is arranged in a rail of the hollow-profile-type, where said hollow profile comprises a slit in the bottom and one or more running surfaces for the carrying wheels arranged in the interior of the hollow profile, and wherein said cart with the carrying wheels are introduced into the hollow profile and that the cart extends through the slit.

[0034] Thereby, the cart extends downward from the rail through the slit and the hoisting unit is attached to the cart in a well-known manner, whereby the rails can be mounted in the ceiling or near the ceiling and the hoist is suspended from the rail.

[0035] The spring member is preferably a helical spring, a gas spring, a rubber spring or a rubber band. The spring may act by providing a pulling or a pushing force between the attachment points on the cart and the bracket. In order to allow for sufficient pulling force during normal traction of the hoist, including any person which is lifted by the hoist, along the rails by means of the motor,

it is necessary to ensure that the spring force presses the drive wheels relatively firmly against the second running surface of the rail. On the other hand, the spring force should be low enough to allow a person rotating a manually operated handle to allow the eccentric cam to act against the spring force.

[0036] In practice, a helical spring having a thread diameter of 2.8-3.3 mm; an outer diameter of 18-20 mm; an unstressed length of 50-65mm and in particular 55-60 mm and a maximal pulling force of 275-325 N may be applicable in a hoist arrangement being suitable for moving persons up to 275 kg.

Description of the Drawing

[0037] In the following paragraphs, a preferred embodiment of the present invention will be described in detail with reference to the drawing, in which

Fig. 1	shows a perspective view of a cart,
Fig. 2a	shows a perspective view of a bracket with a motor unit attached thereto,
Fig. 2b	shows an exploded view of the bracket shown in fig. 2a,
Fig. 3	shows a perspective view of the trolley with the bracket,
Fig. 4	shows an exploded view of the trolley with the bracket and cart and
Figs. 5a-5d	show the position of the bracket and the trolley in relation to each other and in relation to the rail when the hoist is in locked and un locked position respectively.

Detailed Description of the Invention

[0038] As can be seen in fig. 5a a hoist 1 for use in a ceiling mounted rail 2 generally comprises a trolley 3, and a hoist unit 4. The hoist unit 4 is suspended under the trolley 3, which runs in the rail 2, and comprises a wire, strap or the like which can be lowered and raised to lift a physically impaired person. A sling (not shown) can be attached to the end of the hoist unit strap/wire 5, e.g. by means of a hook-like element 6.

[0039] The hoist 1 is arranged in a rail 2 of the hollow-profile-type, where said hollow profile comprises a slit (not shown) in the bottom of the rail 2. The rail comprises a first running surface, 2a (see figs. 5a-d) arranged on the upper inside of the bottom wall of the hollow profile of the rail 2. The lower and outside surface of the lower wall provides a second running surface 2b for drive wheels 14, see below.

[0040] The trolley 3 comprises a cart 7 and a bracket 8 on which a drive motor 9 is attached. The trolley 3 is shown in assembled form in fig. 3 and in an exploded view in fig. 4.

[0041] The cart 7 is shown in fig. 1. The cart generally comprises a plate element 10 with one or more suspension wheels 11 arranged in rotatable manner to the top end of the plate element 10. Typically two suspension wheels 11 are arranged on a common wheel shaft 12 with one wheel 11 on each side of the upper end of the plate element 10. In the figs the cart is shown with four suspension wheels arranged in two sets of suspension wheels 11 although it may be possible to provide more or less suspension wheels 10 on the cart 7 whenever appropriate, e.g. by arranging suspension wheels 11 on one side of the cart 7 only. The suspension wheels 11 are intended to be supported by the first running surface 2a of the rail 2. The cart 7 with the carrying wheels 11 is introduced into the hollow profile of the rails 2 and part of the cart 7 extends through the slit and below the rail 2. The carrying wheels 11 are arranged in the interior of the hollow profile, and are supported by the first running surface 2a.

[0042] The bracket 8 is hinged to the cart 7 as described further below. The bracket 8 preferably comprises two parallel plate shaped members 13a, 13b between which one or more spacers, such as rods, bolts, plate members or stays may be provided.

[0043] Fig. 2a-2b shows the bracket 8. Drive wheels 14 are rotatably fixed to the bracket 8, e.g. by means of a drive wheel shaft 15. The drive wheels are preferably arranged between the side plates 13a, 13b of the bracket to align the drive wheels with the second running surface 2b of the rail 2.

[0044] The bracket 8 is pivotably connected via a hinge connection 16 to the cart 7. The hinge may comprise a rod 17, which is attached between the two side plates 13a- 13b. The hinge rod 17 extends through a corresponding hole 18 in the cart 7 (see fig. 1) in which the hinge rod 17 is rotatable to provide the hinged connection 16.

[0045] On the cart 7, below the attachment points of the suspension wheels 11, the plate member 10 comprises the hole 18 as the attachment point for the hinge member is preferably arranged near the front end or rear end of the cart 7 (when seen in the travelling direction in the rail). An arm 19 with a notch 20 extends in the opposite end of the cart and provides an attachment point for the spring member 20.

[0046] The trolley 3 comprises a spring member 21 (see fig. 3-4) having a first end connected to the notch 20 in the cart 7 and the second end connected to the bracket 8. The spring 21 is provided for pressing the drive wheels 14 against the running surface 2b on the rail 2.

[0047] In the embodiment shown in the figs., the spring 21 is a helical spring member with attachment means provided at each end of the spring 21.

[0048] The motor 9 acts on the drive wheels 14. When the motor 9 is off, the spring force from the spring 21 presses the drive wheels 14 against the rails, which provides a braking effect on the hoist, which cannot be moved when the motor is off and the drive wheel(s) 14 are pressed against the rail 2.

[0049] A cam shaft 22 with an eccentric cam 23 is rotatably mounted in the bracket 8. Upon rotation of the

cam shaft 22, e.g. by an actuator, e.g. a (not shown) handle, the outer radius of the eccentric cam 23 acts on an opposite surface 27 of the cart. The eccentric cam 23 acts against a lower end surface 27 on the cart 7. In figs. 3-4 and 5b and 5d the eccentric cam is shown to act on the lower end surface 27 of the arm 19 for rotation in the hinge 16 of the bracket 8 as shown by arrow A (see figs. 3 and especially 5b and 5d) in relation to the cart 7. Hereby, the drive wheel(s) 14 are released from contact with the second running surface 2b of the rail as can be seen in fig. 5d. Hereby the one or more suspension wheels 11 are able to rotate freely along the rail 2. Thus, the hoist 1 can be moved freely along the rail 2 when the drive wheels are released from contact with the rail 2. This further allows for an assisting person to manually push or pull the hoist along the rail whereby the person in the hoist can be moved even though the motor is inactive, e.g. because of low battery power of a (not shown) battery pack.

[0050] As shown in figs. 3-4, the cart 7 is mounted between the side plates 13a, 13b of the bracket 8. Thus, in order to cooperate with the surface 27 on the cart 7, the eccentric cam 23 and the cart 7 are aligned in the same plane between the side plates 13a, 13b of the bracket 8.

[0051] The bracket comprises a spring attachment member 25, e.g. a hook, which is preferably arranged on a spacer member 26, between the side plates of the bracket 8.

[0052] Thus, the braking and release system according to the present invention provides an entirely mechanical solution, which is independent of any power supply. Further, the braking and release system according to the present invention is inexpensive and very reliable.

[0053] Preferably, a handle is attached to the end 24 of the cam shaft carrying the eccentric cam 23. Alternatively, the shaft carrying the eccentric cam of the shaft and the eccentric cam is rotated by an actuator, e.g. a motor (not shown).

[0054] In a not shown variant, the spring 21 may be a pushing spring which pushes the bracket into a rotational movement in the hinge 16 in order to ensure that the drive wheel or wheels 14 contact the second running surface 2b of the rail. In such a construction the spring 21 and the eccentric cam 23 are arranged on the upper side of the arm 19. The arm will be attached at a lower position on the cart 7 in order to ensure that enough space is provided between the bracket 8 and the rail 2 to ensure proper rotation of the bracket 7 and thus to ensure that the drive wheels 14 contact the second running surface 2b of the rail 2 upon rotation of the bracket 7.

Reference numbers

[0055]

1. Hoist
2. Rail
   a. First running surface
   b. Second running surface
3. Trolley
4. Hoist unit
5. Strap, Wire
6. Hook for attachment of sling
7. Cart
8. Bracket
9. Motor
10. Plate element
11. Suspension wheels; carrying wheels
12. Suspension wheel shafts
13. Side plates of bracket
14. Drive wheels
15. Drive wheel shaft
16. Hinge
17. Hinge rod
18. Hinge hole in cart
19. Arm
20. Notch for attachment of spring
21. Spring
22. Cam shaft
23. Eccentric cam
24. Attachment of actuator of cam shaft.
25. Spring attachment hook
26. Spacer

A: Arrow indicating rotation

Claims

1. A hoist, preferably for use in a ceiling mounted rail, where said hoist comprises a trolley with one or more wheels arranged to run along a first running surface of a rail, said trolley comprises one or more drive wheels and one or more carrying wheel, wherein said one or more carrying wheels are rotatably fixed on a cart and where the one or more drive wheels are rotatably fixed to a bracket and where said bracket is pivotably connected via a hinge to the cart, where said trolley comprises a spring member having a first end connected to the cart and the second end connected to the bracket provided for pressing the one or more drive wheels against a second running surface of the rail, and wherein a shaft with an eccentric cam is rotatably mounted in the bracket, where said eccentric cam upon rotation of the shaft acts against a surface on the cart for rotation of the bracket in relation to the cart in the hinge whereby said one or more drive wheels are released from contact with the running surface, whereby the one or more carrying wheels are able to rotate freely along the rail.

2. A hoist according to claim 1, **characterized in, that** an actuator, such as a handle, is attached to the shaft carrying the eccentric cam for operation of the shaft and the eccentric cam.

3. A hoist according to claim 1, **characterized in, that**

the shaft carrying the eccentric cam of the shaft and the eccentric cam is rotated by a motor.

4. A hoist according to any of the claims 1-3, **characterized in, that** the cart is a plate shaped member with an end portion arranged to be attached to said one or more carrying wheels.

5. A hoist according to any of the claims 1-4, **characterized in, that** the bracket comprises two parallel plate shaped members between which one or more spacers, such as stays, rods or bolts, are provided, and wherein said shaft with the eccentric cam is arranged perpendicularly to said plate shaped members.

6. A hoist according to claim 1 or 5, **characterized in, that** a spring attachment member is arranged perpendicularly to said plate shaped members of the bracket.

7. A hoist according to any of the claims 1-6, **characterized in, that** the cart comprises attachment means for the spring member, where said spring attachment means are preferably arranged in the opposite end of the cart in relation to the attachment of the hinge member.

8. A hoist according to any of the claims 1-7, **characterized in, that** a motor is fixed to the hinged bracket.

9. A hoist according to any of the claims 1-8, **characterized in, that** the one or more drive wheels are attached to the bracket between the parallel plate members in pivotable manner.

10. A hoist according to any of the claims 1-9, **characterized in, that** the hoist is arranged in a rail of the hollow-profile-type, where said hollow profile comprises a slit in the bottom and one or more first running surfaces for the carrying wheels arranged in the interior of the hollow profile, and wherein said cart with the carrying wheels are introduced into the hollow profile and that the cart extends through the slit.

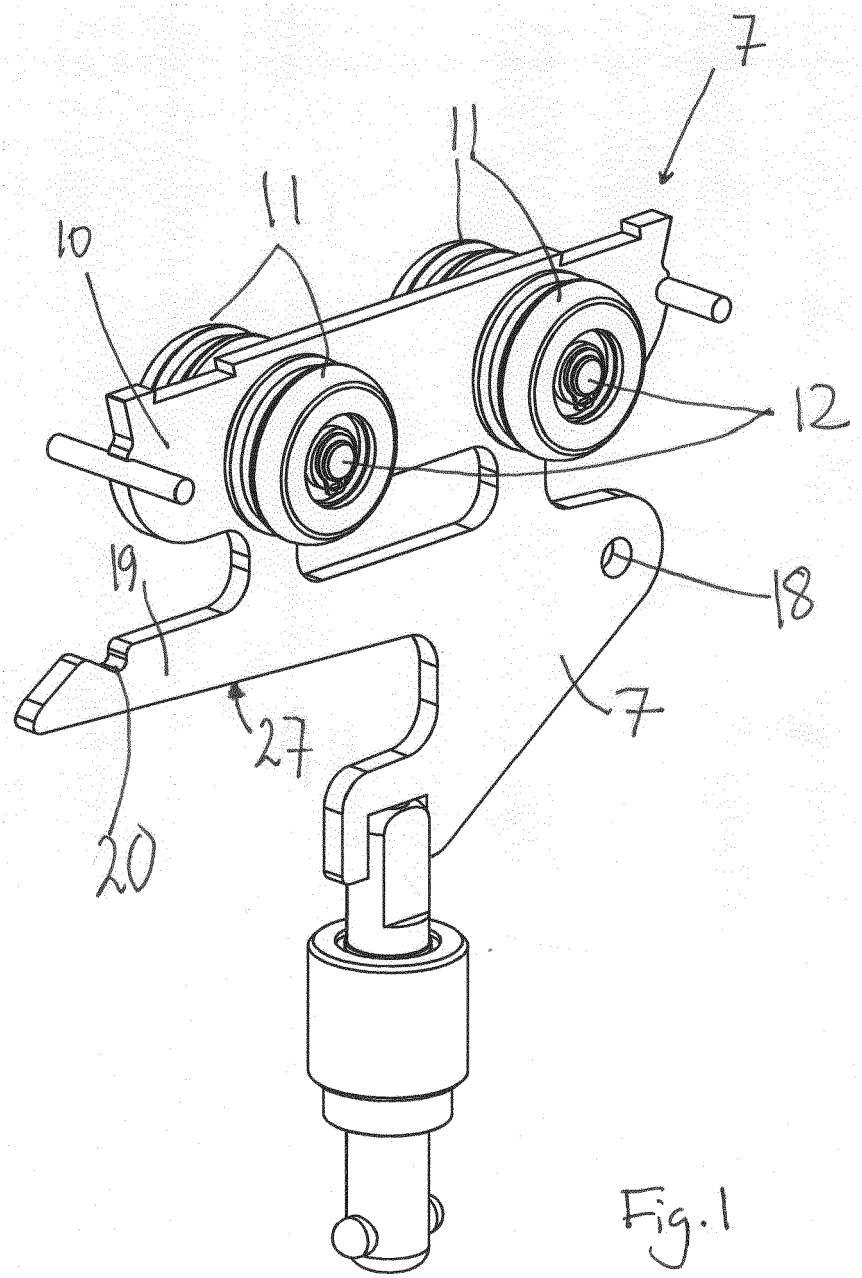


Fig. 1

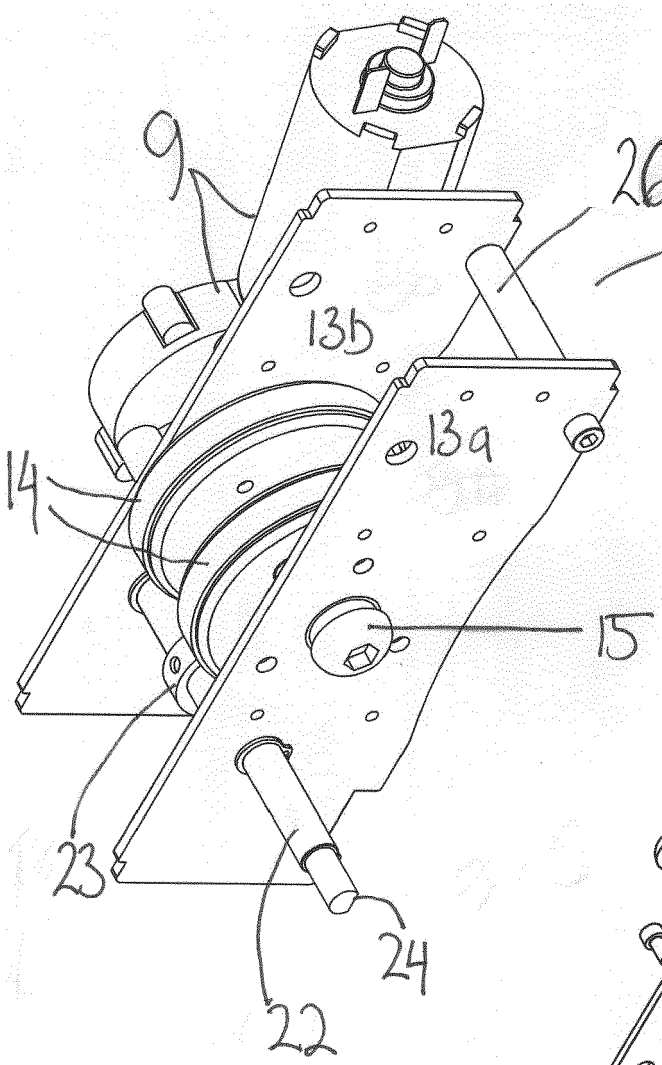


Fig. 2a

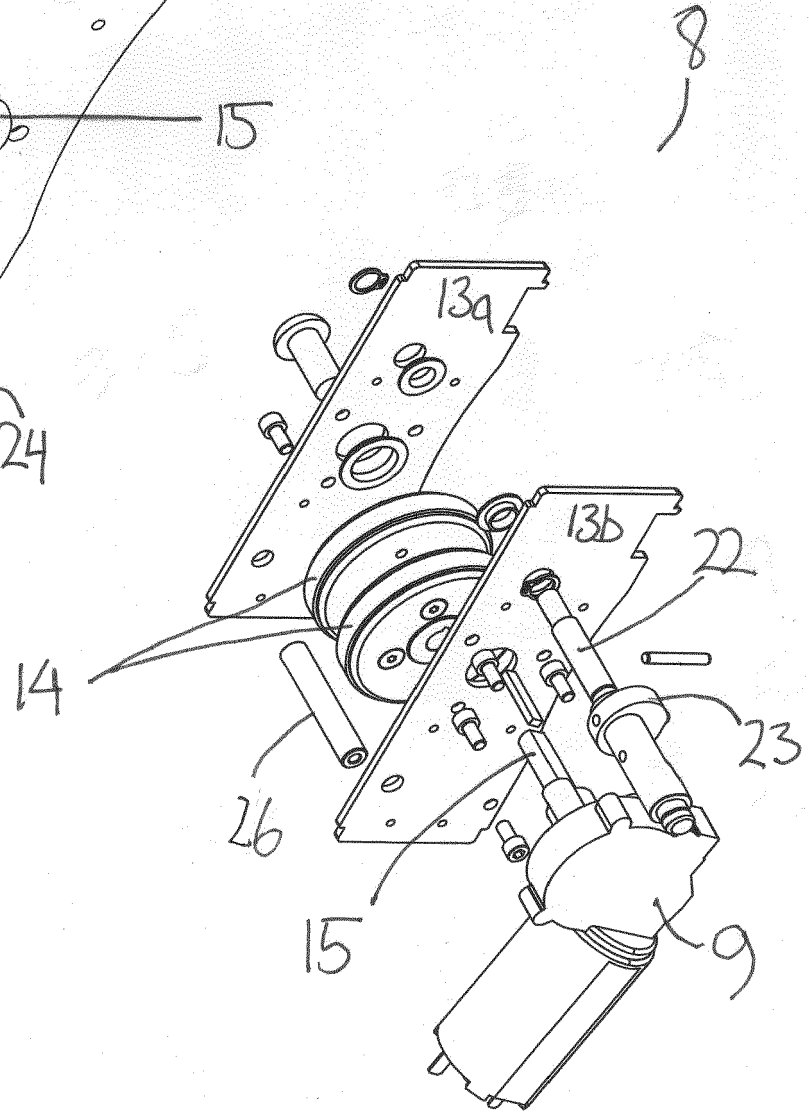


Fig. 2b

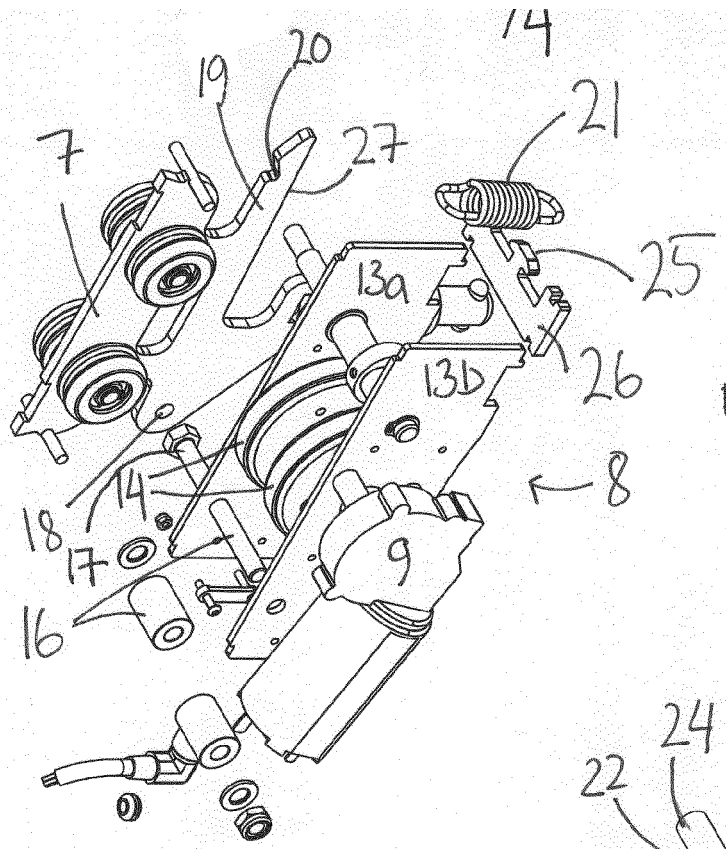

14
19
20
21
7
27
25
13a
26
13b
8
18
14
17
9
16

Fig. 4

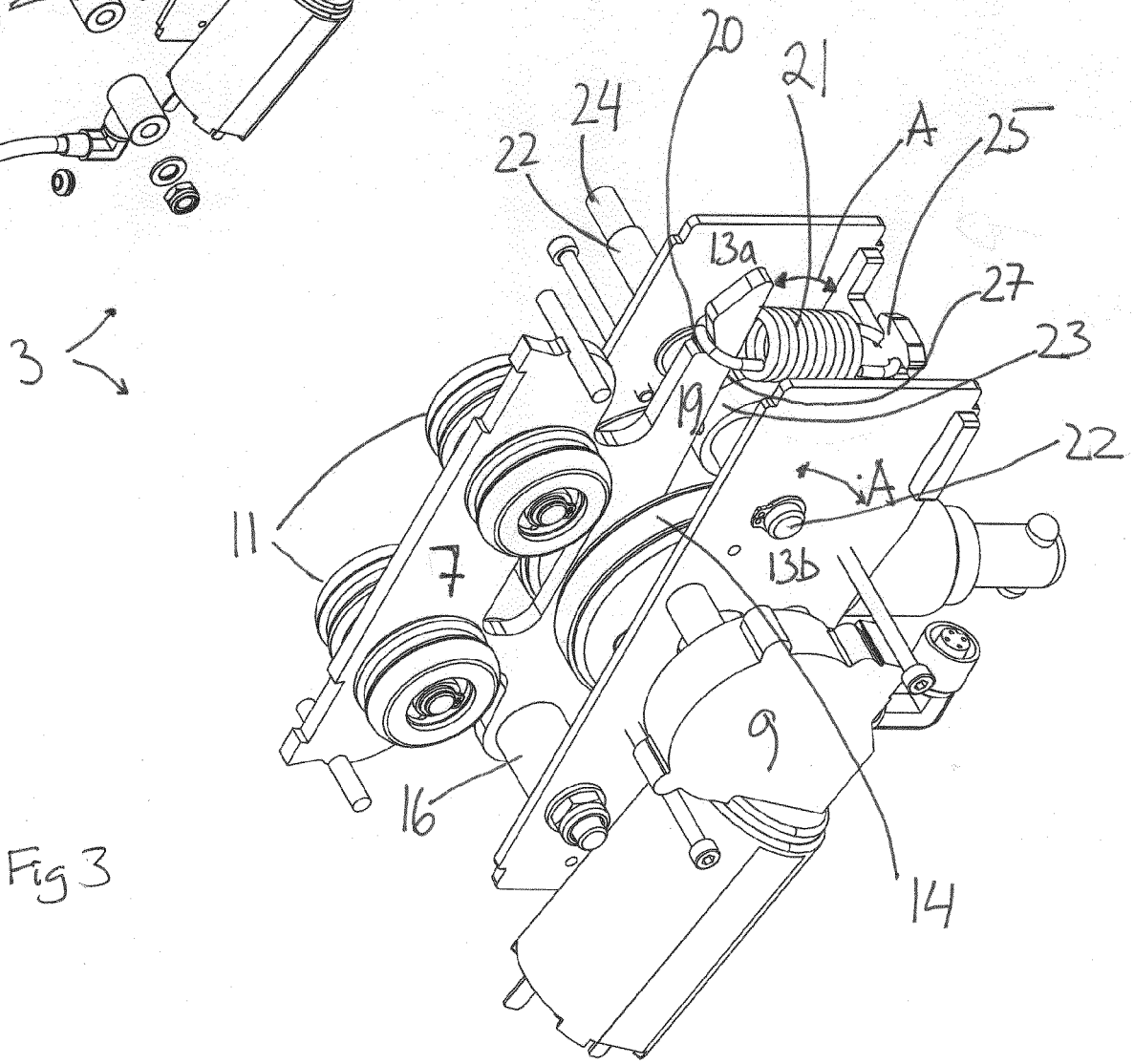

3
20
21
24
22
A
25
13a
27
23
19
22
A
11
7
13b
9
16
14

Fig 3

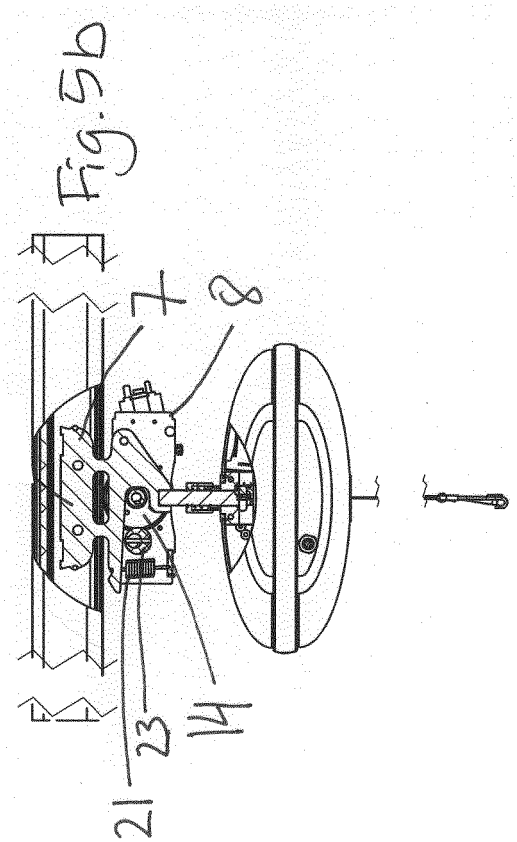


Fig.5b

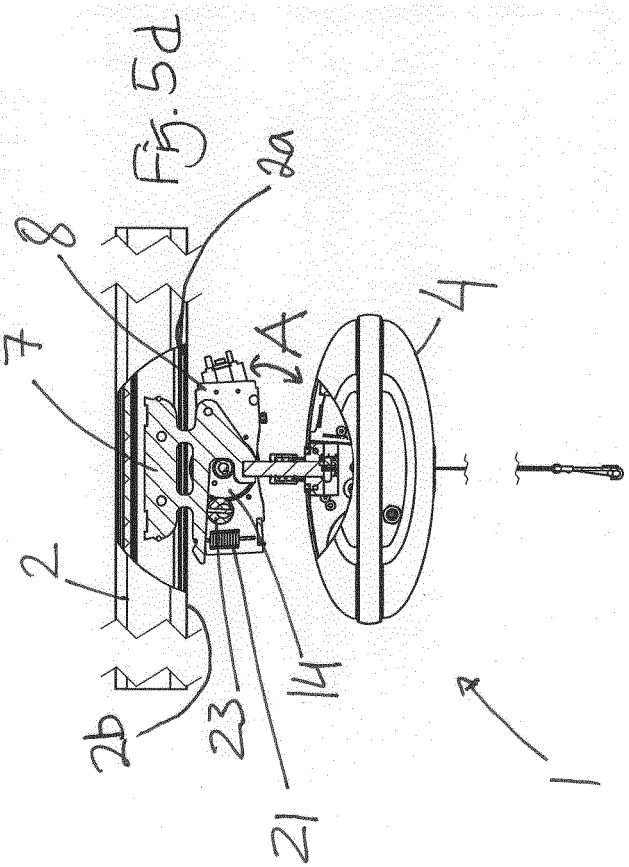


Fig.5d

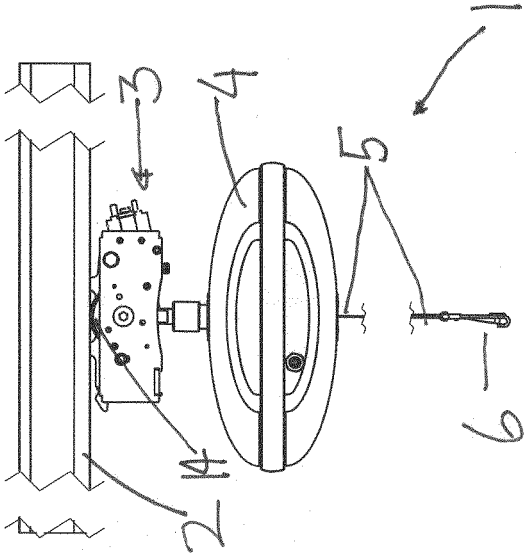


Fig.5a

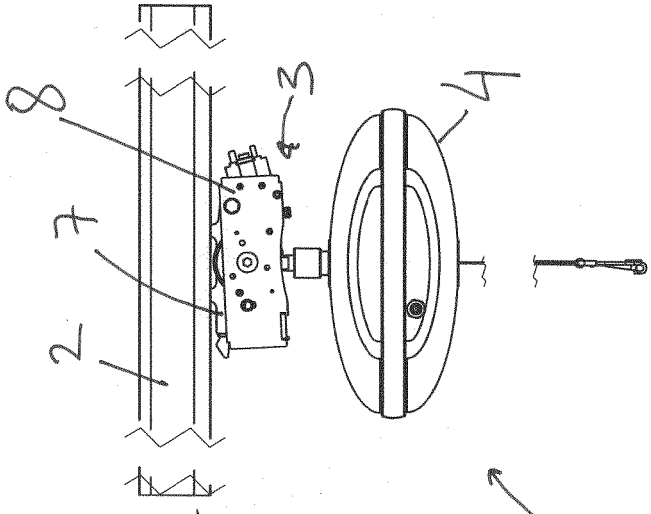


Fig.5c

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 16 20 4008

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 840 073 A1 (INVACARE INT SARL [CH]) 3 October 2007 (2007-10-03) * paragraph [0009] - paragraph [0011] * * paragraph [0018] * * figures 1-4 *	1-10	INV. A61G7/10
A	US 4 372 452 A (MCCORD LAWLESS D) 8 February 1983 (1983-02-08) * column 1, line 28 - column 5, line 51 * * figures 1-8 *	1-10	
A	US 3 498 236 A (MEEK LONNIE E) 3 March 1970 (1970-03-03) * column 4, line 38 - line 71 * * figures 1-6 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			A61G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 May 2017	Ong, Hong Djien

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 20 4008

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-05-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1840073 A1	03-10-2007	AT 489322 T	15-12-2010
		CA 2647459 A1	04-10-2007
		DK 1999055 T3	14-03-2011
		EP 1840073 A1	03-10-2007
		EP 1999055 A1	10-12-2008
		NO 333820 B1	23-09-2013
		US 2009308828 A1	17-12-2009
		WO 2007110846 A1	04-10-2007
US 4372452 A	08-02-1983	NONE	
US 3498236 A	03-03-1970	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82